

PESD5V0L6UAS; PESD5V0L6US

Low capacitance 6-fold ESD protection diode arrays

Rev. 02 — 9 November 2004

Product data sheet

1. Product profile

1.1 General description

Low capacitance 6-fold ESD protection diode arrays in small plastic packages designed to protect up to six transmission or data lines from the damage caused by ElectroStatic Discharge (ESD) and other transients.

Table 1: Product overview

Type number	Package	
	Name	Philips
PESD5V0L6UAS	TSSOP8	SOT505-1
PESD5V0L6US	SO8	SOT96-1

1.2 Features

- ESD protection of up to six lines
- Low diode capacitance
- Max. peak pulse power: $P_{PP} = 35$ W
- Low clamping voltage: $V_{(CL)R} = 15$ V
- Ultra low leakage current: $I_{RM} = 8$ nA
- ESD protection of up to 20 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 2.5$ A.

1.3 Applications

- Computers and peripherals
- Communication systems
- Audio and video equipment
- High speed data lines
- Parallel ports.

1.4 Quick reference data

Table 2: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse stand-off voltage		-	-	5	V
C_d	diode capacitance	$V_R = 0$ V; $f = 1$ MHz	-	16	19	pF

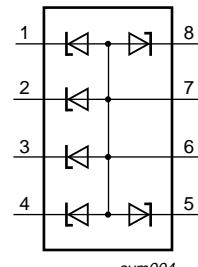
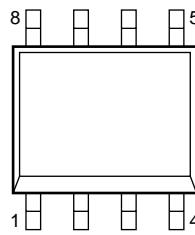
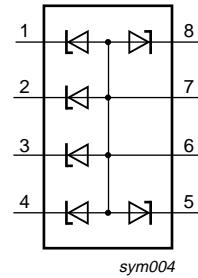
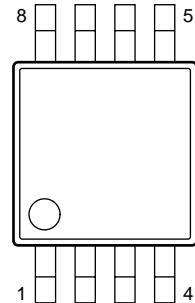
PHILIPS



2. Pinning information

Table 3: Discrete pinning

Pin	Description	Simplified outline	Symbol
TSSOP8			
1	cathode 1		
2	cathode 2		
3	cathode 3		
4	cathode 4		
5	cathode 5		
6	common anode		
7	common anode		
8	cathode 6		
SO8			
1	cathode 1		
2	cathode 2		
3	cathode 3		
4	cathode 4		
5	cathode 5		
6	common anode		
7	common anode		
8	cathode 6		



3. Ordering information

Table 4: Ordering information

Type number	Package			Version
	Name	Description		
PESD5V0L6UAS	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm		SOT505-1
PESD5V0L6US	SO8	plastic small outline package; 8 leads; body width 3.9 mm		SOT96-1

4. Marking

Table 5: Marking

Type number	Marking code
PESD5V0L6UAS	5V06U
PESD5V0L6US	5V06US



5. Limiting values

Table 6: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
P _{PP}	peak pulse power	8/20 μ s pulse	[1][2]	-	35 W
I _{PP}	peak pulse current	8/20 μ s pulse	[1][2]	-	2.5 A
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-65	+150	°C
T _{stg}	storage temperature		-65	+150	°C

[1] Non-repetitive current pulse 8/20 μ s exponentially decay waveform according to IEC 61000-4-5; see [Figure 1](#).

[2] Measured from pin 1, 2, 3, 4, 5 or 8 to pin 6 or 7.

Table 7: ESD maximum ratings

Symbol	Parameter	Conditions	Min	Max	Unit
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge)	[1][2]	-	20 kV
		HBM MIL-STD883	-	10	kV

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see [Figure 2](#).

[2] Measured from pin 1, 2, 3, 4, 5 or 8 to pin 6 or 7.

Table 8: ESD standards compliance

ESD Standard	Conditions
IEC 61000-4-2, level 4 (ESD); see Figure 2	> 15 kV (air); > 8 kV (contact)
HBM MIL-STD883, class 3	> 4 kV

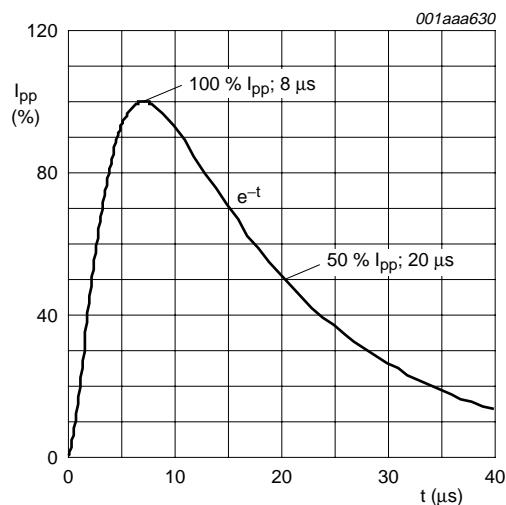


Fig 1. 8/20 μ s pulse waveform according to IEC 61000-4-5.

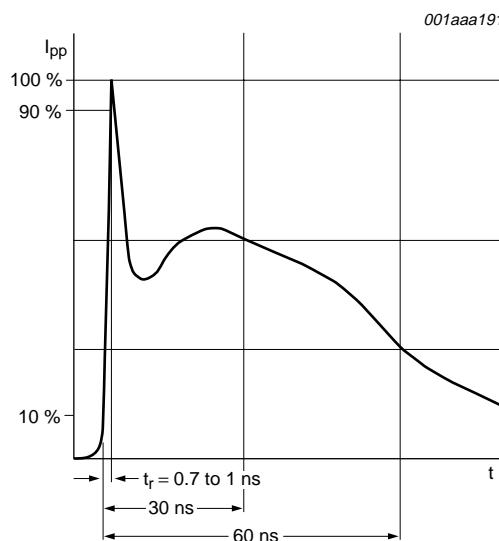


Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2.



6. Characteristics

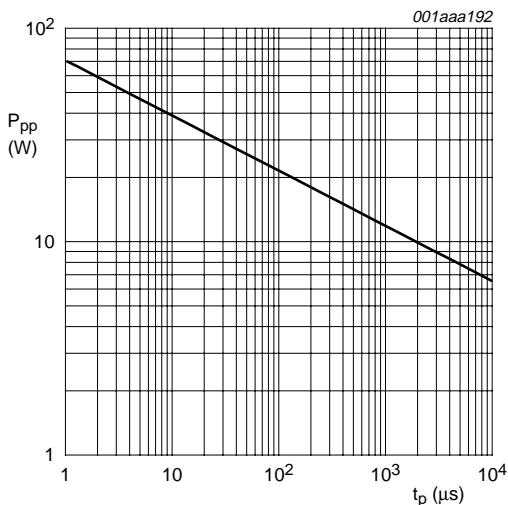
Table 9: Characteristics

$T_{amb} = 25^\circ C$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse stand-off voltage		-	-	5	V
I_{RM}	reverse leakage current	$V_{RWM} = 5 \text{ V}$	-	8	25	nA
$V_{(CL)R}$	clamping voltage	$I_{PP} = 1 \text{ A}$	[1][2]	-	10	V
		$I_{PP} = 2.5 \text{ A}$	[1][2]	-	15	V
$V_{(BR)}$	breakdown voltage	$I_R = 1 \text{ mA}$	6.4	6.8	7.2	V
r_{dif}	differential resistance	$I_R = 1 \text{ mA}$	-	-	100	Ω
C_d	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz};$ see Figure 5	-	16	19	pF

[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform according to IEC 61000-4-5; see [Figure 1](#).

[2] Measured between each cathode on pins 1, 2, 3, 4, 5 or 8 and anode on pin 6 or 7.



$T_{amb} = 25^\circ\text{C}$.

Fig 3. Peak pulse power as a function of exponential pulse duration t_p ; typical values.

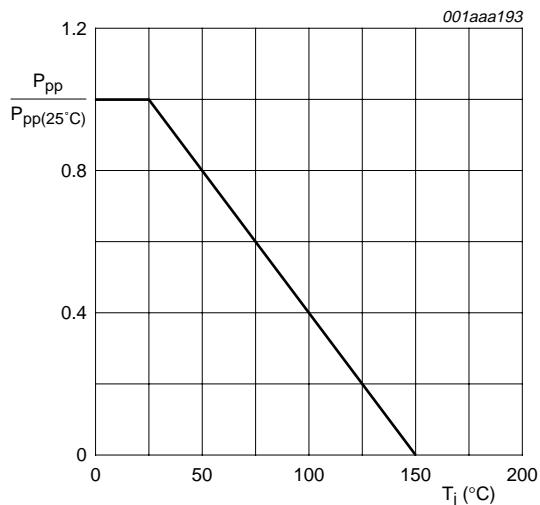
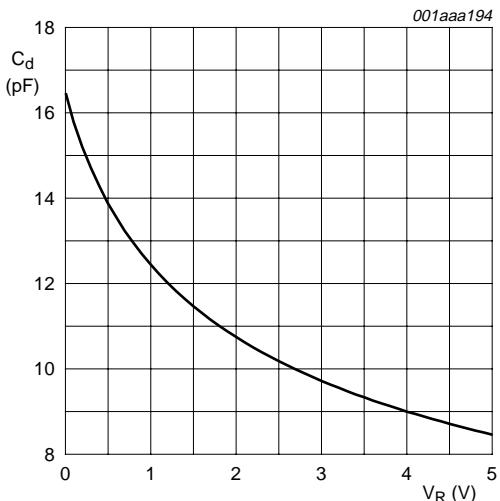


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values.



$T_{amb} = 25^\circ\text{C}$; $f = 1\text{ MHz}$.

Fig 5. Diode capacitance as a function of reverse voltage; typical values.

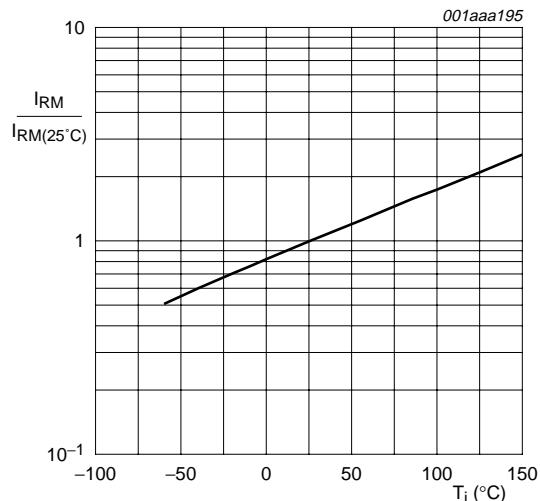
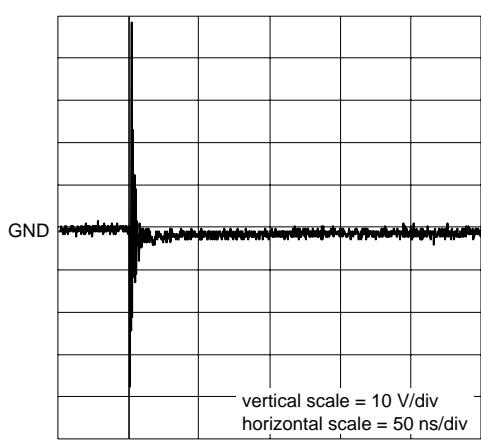
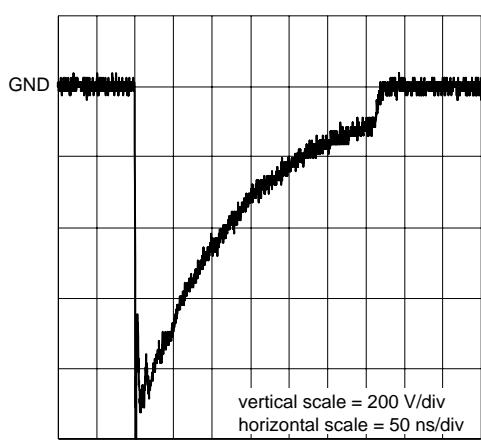
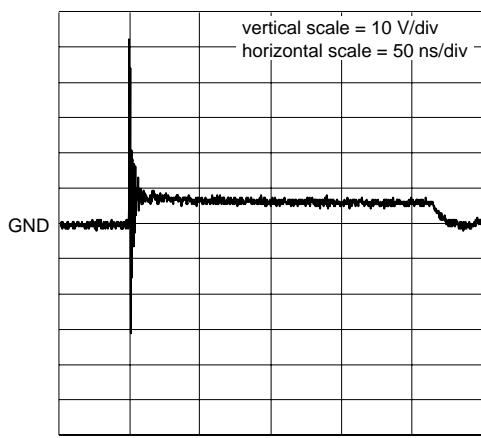
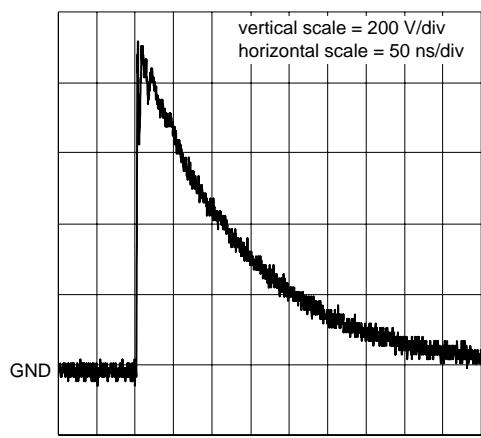
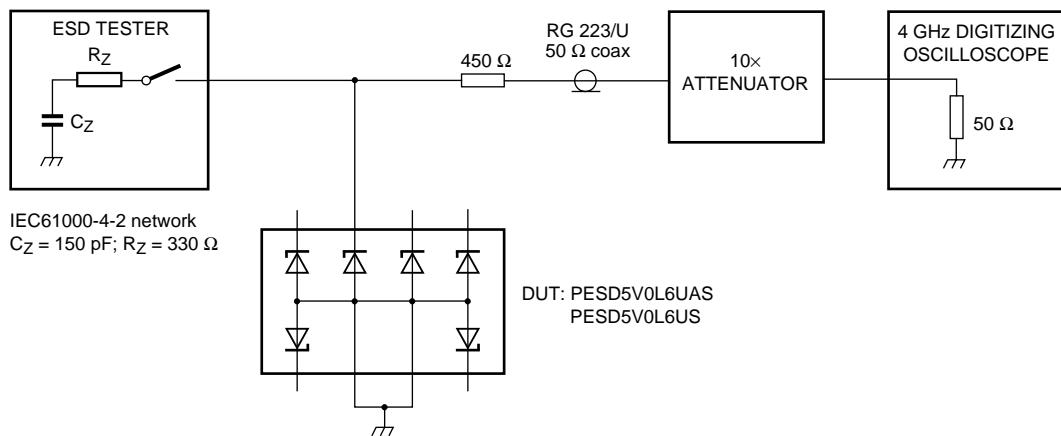


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values.



006aaa064

Fig 7. ESD clamping test set-up and waveforms.

7. Application information

The PESD5V0L6UAS and the PESD5V0L6US are designed for protection of up to six unidirectional data lines from the damage caused by ElectroStatic Discharge (ESD) and surge pulses. The PESD5V0L6UAS and the PESD5V0L6US may be used on lines where the signal polarity is above or below ground.

The PESD5V0L6UAS and the PESD5V0L6US provide a surge capability of 35 W per line for a 8/20 μ s waveform.

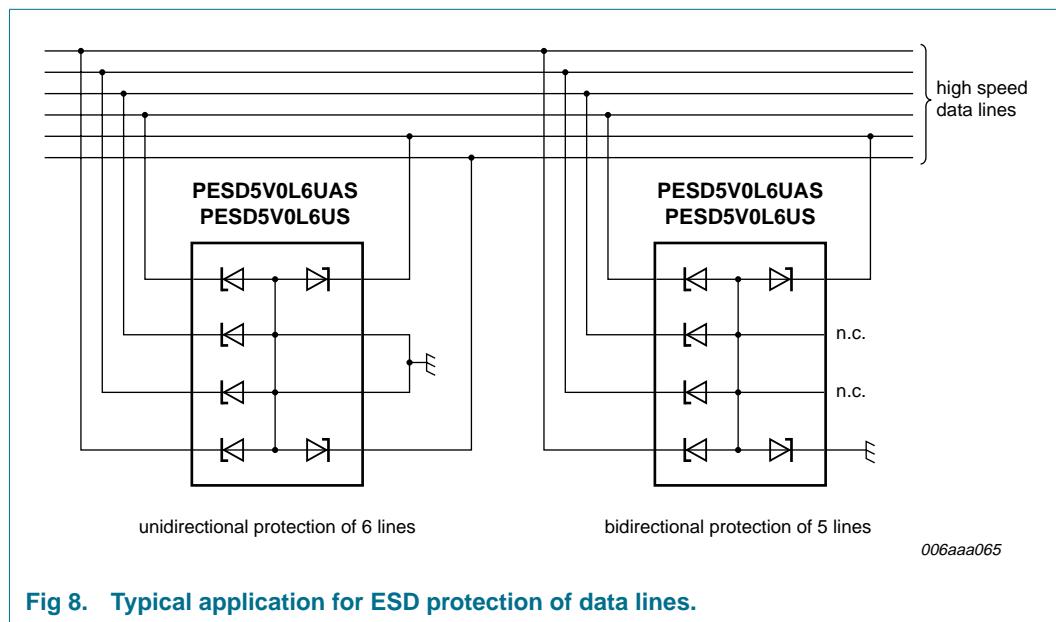


Fig 8. Typical application for ESD protection of data lines.

Circuit board layout and protection device placement:

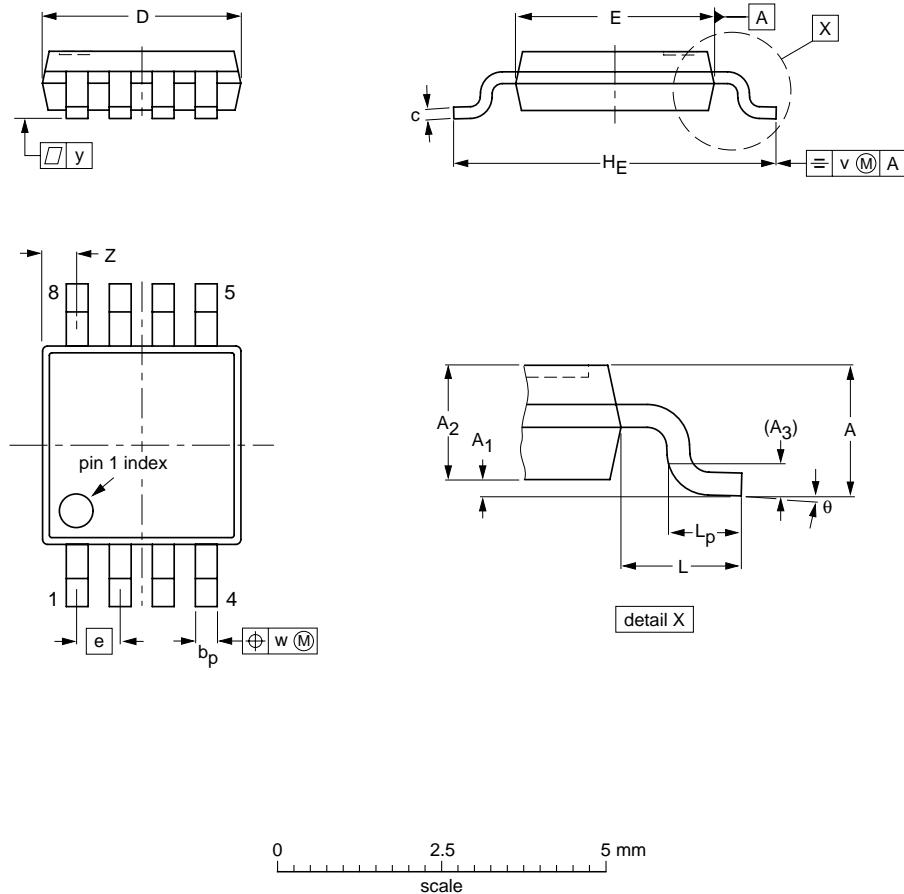
Circuit board layout is critical for the suppression of ESD, EFT and surge transients. The following guidelines are recommended:

1. Place the protection device as close to the input terminal or connector as possible.
2. The path length between the protection device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protection conductors in parallel with unprotected conductor.
5. Minimize all printed-circuit board conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Ground planes should be used whenever possible. For multilayer printed-circuit boards, use ground vias.

8. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm

SOT505-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽²⁾	e	H _E	L	L _p	v	w	y	z ⁽¹⁾	θ
mm	1.1	0.15	0.95	0.25	0.45	0.28	3.1	3.1	0.65	5.1	0.94	0.7	0.4	0.1	0.1	0.70	6°
		0.05	0.80	0.25	0.25	0.15	2.9	2.9		4.7						0.35	0°

Notes

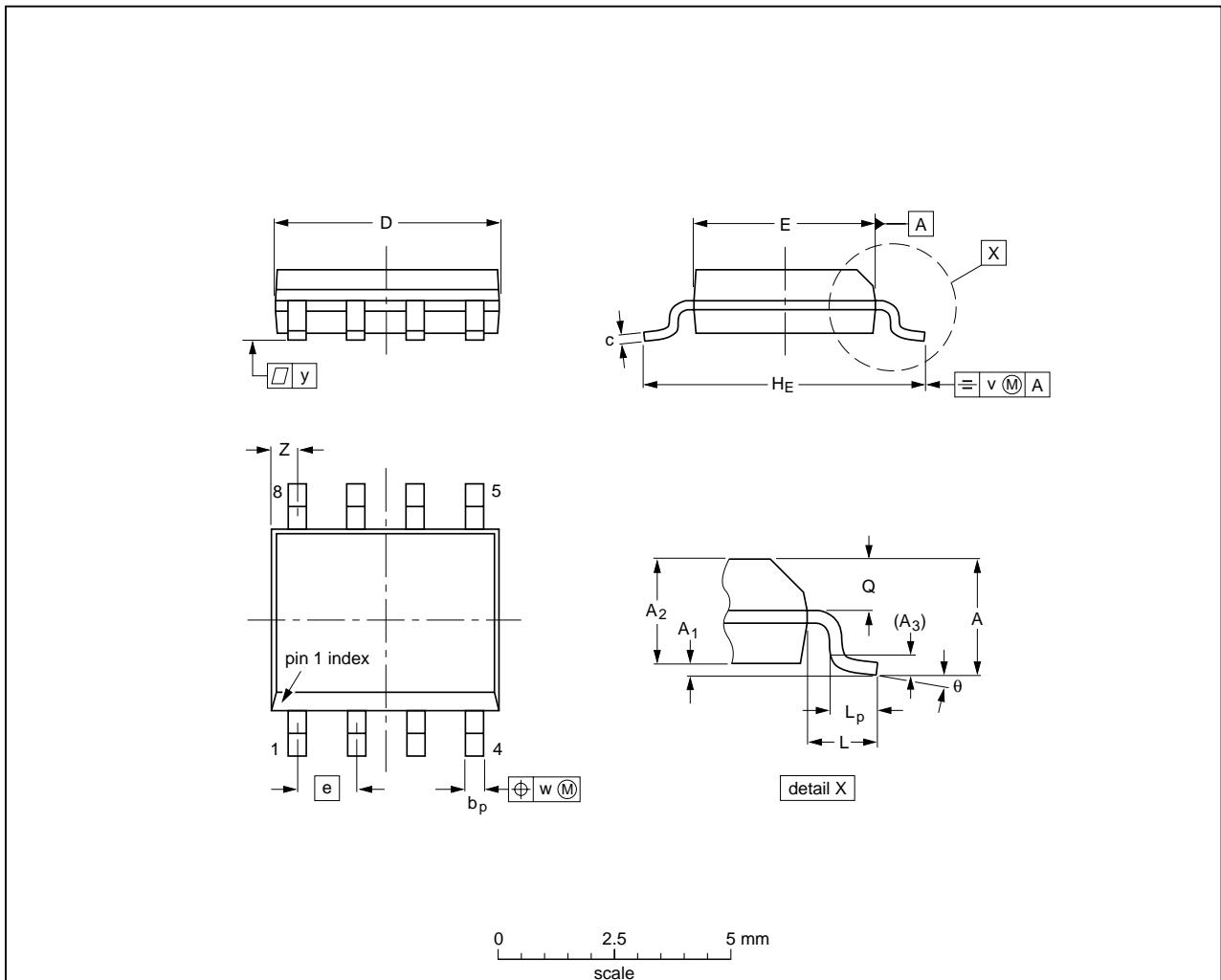
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT505-1						-99-04-09- 03-02-18

Fig 9. Package outline SOT505-1 (TSSOP8).

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽²⁾	e	H _E	L	L _p	Q	v	w	y	z ⁽¹⁾	θ
mm	1.75 0.10	0.25 0.36	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069 0.004	0.010 0.049	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.20	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT96-1	076E03	MS-012			99-12-27 03-02-18

Fig 10. Package outline SOT96-1 (SO8/MS-012).



9. Packing information

Table 10: Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code. [1]

Type number	Package	Description	Packing quantity	
			1 000	2 500
PESD5V0L6UAS	SOT505-1	8 mm pitch, 12 mm tape and reel	-	-118
PESD5V0L6US	SOT96-1	8 mm pitch, 12 mm tape and reel	-115	-118

[1] For further information and the availability of packing methods, see [Section 14](#).



10. Revision history

Table 11: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PESD5V06UAS_US_2	20041109	Product data sheet	-	9297 750 13537	PESD5V0L6US_1
Modifications:	<ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.• PESD5V0L6UAS added• Table 1: product overview added• Section 9: packing information added				
PESD5V0L6US_1	20040315	Product specification	-	9397 750 12248	-



11. Data sheet status

Level	Data sheet status ^[1]	Product status ^{[2][3]}	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

12. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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